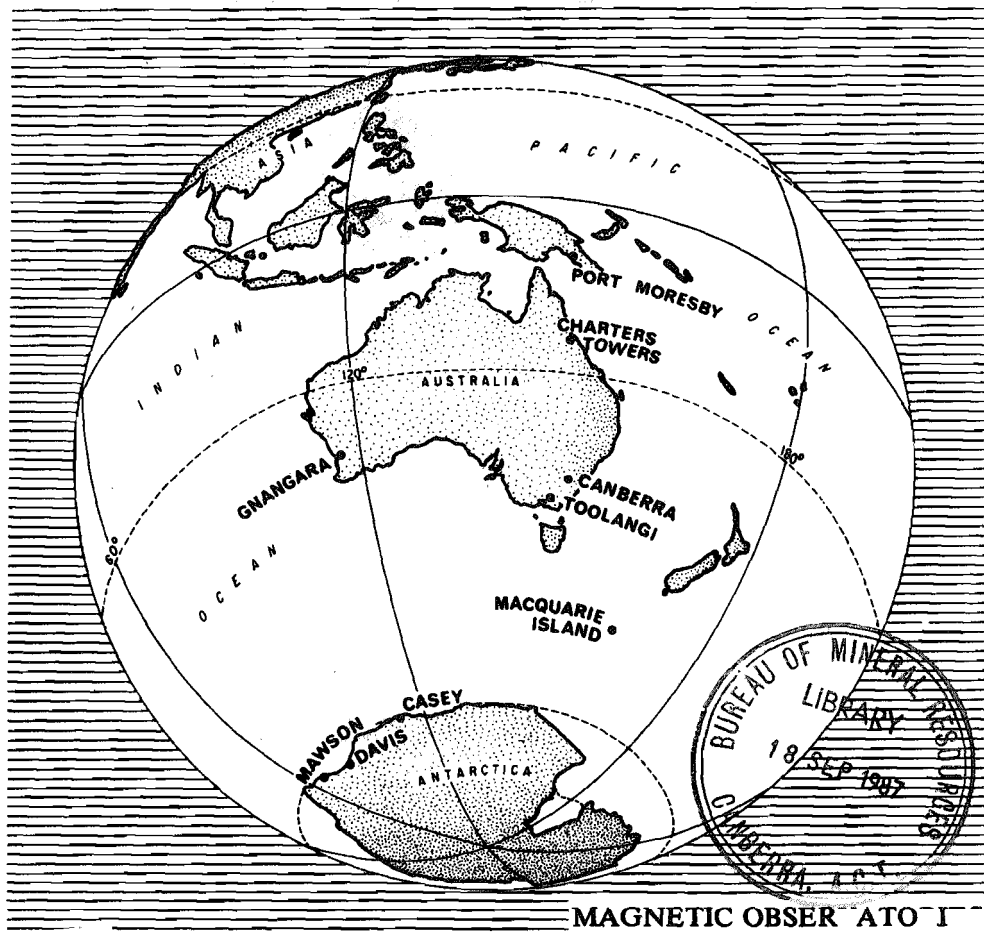


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GEOPHYSICAL OBSERVATORY REPORT



MAGNETIC OBSERVATIONS

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VOLUME 34 No. 12

DECEMBER 1986

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

DEPARTMENT OF RESOURCES AND ENERGY

Minister: Senator The Hon. Gareth J. EVANS

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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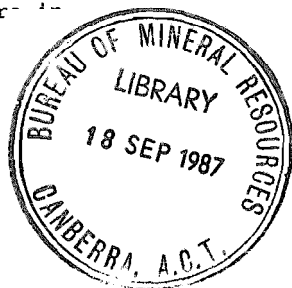
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The observers at Casey Davis and Macquarie Island are officers of the Antarctic Division, Department of Science and Technology: their contributions are gratefully acknowledged. These observers and the Bureau of Mineral Resources (BMR) geophysicist at Mawson are members of the Australian National Antarctic Research Expeditions (ANARE).

Data from the Port Moresby Geophysical Observatory are contributed by the Geological Survey of Papua New Guinea.

The terminology used in this report is that accepted by International Association of Geomagnetism and Aeronomy. The unit of field intensity is nanotesla (nT). All times are in Universal Time.



CONTRIBUTING OBSERVATORIES

OBSERVATORY	OBSERVER IN CHARGE	GEOGRAPHIC		GEOMAGNETIC	
		LAT	LONG	LAT	LONG
PORT MORESBY	I.D.Ripper	9° 25' S	147° 09' E	-18.2°	219.6°
CHARTERS TOWERS	J.M.Millican	20° 05' S	146° 15' E	-28.8°	220.2°
GNANGARA	P.J.Gregson	31° 47' S	115° 57' E	-42.9°	187.8°
CANBERRA	P.A.Hopgood	35° 19' S	149° 22' E	-43.5°	226.4°
MACQUARIE I	I.G.Jacobsen	54° 30' S	158° 57' E	-60.6°	244.6°
MAWSON	S.D.Dennis	67° 36' S	62° 53' E	-73.3°	105.9°
DAVIS	R.G.McLoughlin	68° 35' S	77° 58' E	-76.9°	123.5°
CASEY	R.A.Rachinger	66° 17' S	110° 32' E	-77.5°	182.4°

MAGNETOGRAPHS

OBSERVATORY	CODE	TYPE	ELEMENT/SCALE-VALUE			
PORT MORESBY	PMG	La cour (A)	H/3	D/5	Z/4	
CHARTERS TOWERS	CTA	EDA/ELSEC (D/1)	X	Y	Z	
GNANGARA	GNA	Eschenhagen (A)	H/3	D/7	Z/6	
CANBERRA	CNB	ELSEC (D/.1)	D	I	F	
MACQUARIE ISLAND	MCQ	PEM (D/.1)	X	Y	Z	
MAWSON	MAW	PEM (D/.1)	X	Y	Z	

A = analogue, 20mm/hr, scale values in nT/mm
 D/1 = ditigal, 1 min readings, 1 nT resolution
 D/.1 = ditigal, 1 min readings, 0.1 nT resolution
 PEM = BMR Photo-electronic magnetograph.

MAGNETOMETERS

Absolute data are based on observations made with QHM's, BMZ's, fluxgate-theodolites, declinometers and proton precession magnetometers.

Errors in preliminary values obtained from magnetograms are not likely to exceed 5 nT or 0.5 minutes of arc.

NEW MAGNETIC OBSERVATORY AT LEARMONTH, NW AUSTRALIA

A new magnetic observatory is scheduled to come into operation in 1986 at Learmonth on North-West Cape, Western Australia, overlooking Exmouth Gulf. The geographic co-ordinates are: latitude $22^{\circ} 13'$ south; longitude $114^{\circ} 06'$ east. The 3 letter code for the Observatory is LRM.

The new observatory is a joint project between the Bureau of Mineral Resources, Geology and Geophysics (BMR) of the Australian Department of Resources and Energy, and the Ionospheric Prediction Service (IPS) of the Australian Department of Science.

The observatory will be situated within the area of the Learmonth Solar Observatory which is jointly operated by the Australian Department of Science and the United States Air Force.

An EDA 3-Axis fluxgate magnetometer will be used to measure variations in X, Y and Z which will be recorded digitally each minute. Absolute observations of D, I and F will be performed semi-weekly using a fluxgate theodolite and a proton precession magnetometer.

The data will be reduced by BMR and published in the Geophysical Observatory Report.

PORT MORESBY

MAGNETIC K-INDICES - DECEMBER 1986

Range for lower limit of K=9 is 300nT

DAY	K-INDICES								K-SUM
01	3	2	2	2	2	2	2	2	17
02	2	1	1	2	2	1	2	1	12
03	1	1	1	2	2	2	1	1	11
04	1	1	1	2	3	2	2	2	14
05	2	1	1	1	1	1	1	1	09
06	3	2	2	2	1	1	2	2	15
07	3	3	3	3	2	2	1	1	18
08	1	1	1	2	1	1	2	2	11
09	2	2	1	2	1	3	3	1	15
10	1	1	1	2	2	2	2	2	13
11	3	2	2	2	2	2	1	2	16
12	1	1	1	2	2	2	1	2	12
13	1	2	2	2	2	2	3	3	17
14	4	5	5	2	2	1	2	1	22
15	1	1	1	1	1	1	2	2	10
16	3	2	2	2	2	4	2	1	18
17	1	1	1	1	3	2	2	2	13
18	1	1	2	2	2	2	2	2	14
19	2	2	1	2	1	1	2	2	13
20	2	2	2	2	2	3	2	2	17
21	1	1	2	2	4	2	3	3	18
22	3	3	2	3	3	3	2	2	21
23	3	3	3	3	4	2	2	3	23
24	3	2	2	2	1	2	2	2	16
25	2	3	2	2	2	2	2	3	18
26	2	3	2	3	1	2	2	2	17
27	2	2	1	2	2	2	1	2	14
28	1	1	1	1	0	0	1	2	07
29	1	1	2	1	1	1	0	1	08
30	1	1	1	1	1	1	1	1	08
31	2	2	2	2	3	3	1	2	17

Mean of K-Sum is 14.7

Frequency of K-Indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	3	84	120	34	5	2	0	0	0	0	0

GNANGARA

MAGNETIC K-INDICES - DECEMBER 1986

Range for lower limit of K=9 is 450nT

DAY	K-INDICES								K-SUM
01	3	3	3	3	2	3	3	1	21
02	1	1	1	2	2	2	1	2	12
03	2	0	1	1	2	1	1	1	09
04	1	0	1	2	3	2	2	3	14
05	1	0	0	0	1	0	0	0	02
06	2	2	1	2	0	2	1	1	11
07	1	2	2	3	2	2	1	1	14
08	1	1	1	1	1	1	1	1	08
09	2	1	2	1	1	3	3	1	14
10	3	2	1	2	1	3	3	2	17
11	2	1	1	1	2	2	1	1	11
12	1	0	0	1	1	1	2	2	08
13	1	2	2	1	2	2	3	4	17
14	3	4	3	3	2	1	2	1	19
15	2	1	1	1	1	1	2	2	11
16	4	3	2	2	2	4	2	2	21
17	1	2	1	1	3	2	2	2	14
18	2	1	2	1	2	2	3	3	16
19	3	2	2	1	2	1	2	3	16
20	3	3	2	2	2	3	1	2	18
21	2	2	1	3	4	4	4	3	23
22	3	2	3	2	4	5	2	2	23
23	3	2	3	3	4	3	3	3	24
24	3	2	2	2	3	2	3	2	19
25	2	2	2	2	2	2	1	2	15
26	3	3	3	3	3	3	3	3	24
27	3	2	2	2	2	2	2	2	17
28	1	1	1	1	0	1	0	2	07
29	2	1	1	1	1	1	0	1	08
30	1	1	1	1	1	3	2	2	12
31	2	2	3	2	3	2	1	2	17

Mean of K-Sum is 14.9

Frequency of K-Indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	14	79	93	52	9	1	0	0	0	0	0

CANBERRA

MAGNETIC K-INDICES - DECEMBER 1986

Range for lower limit of K=9 is 450nT

DAY	K-INDICES								K-SUM
01	-	-	3	2	1	3	2	1	--
02	1	2	2	2	2	1	1	1	12
03	0	0	1	1	2	1	0	0	05
04	0	0	1	2	3	2	2	2	12
05	2	1	1	0	0	0	0	1	05
06	2	1	2	1	0	1	1	1	09
07	1	2	2	2	2	2	1	0	12
08	0	1	0	1	0	1	2	2	07
09	2	2	2	2	1	3	3	1	16
10	1	1	1	2	2	2	2	2	13
11	3	1	1	1	2	1	0	0	09
12	0	0	1	2	2	1	1	2	09
13	1	2	2	2	2	2	3	4	18
14	3	5	4	3	2	0	2	0	19
15	1	1	1	0	0	1	2	1	07
16	3	3	2	2	2	4	1	1	18
17	1	1	1	1	3	2	1	1	11
18	1	0	2	2	2	1	2	2	12
19	2	2	1	1	0	0	1	2	09
20	2	2	3	2	2	3	1	1	16
21	1	1	1	1	3	3	2	3	15
22	2	3	2	2	3	4	1	2	19
23	1	3	3	4	4	2	2	3	22
24	3	2	2	2	1	1	3	2	16
25	2	2	2	3	1	2	1	2	15
26	2	3	3	3	2	2	2	2	19
27	2	2	2	1	1	2	1	1	12
28	0	1	1	0	0	0	0	1	03
29	1	1	1	0	0	0	0	0	03
30	1	1	0	0	1	1	2	3	09
31	0	1	2	2	3	2	0	2	12

Mean of K-Sum is 12.1

Frequency of K-Indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	40	81	88	30	6	1	0	0	0	0	2

MAWSON

MAGNETIC K-INDICES - DECEMBER 1986

Range for lower limit of K=9 is 1500nT

DAY	K-INDICES								K-SUM
01	4	4	3	3	2	1	6	2	25
02	4	3	1	2	1	2	1	4	18
03	3	1	1	1	2	2	4	5	19
04	2	1	1	1	3	2	4	4	18
05	5	1	0	1	1	0	0	3	11
06	2	4	1	1	0	0	3	3	14
07	2	3	3	3	2	2	5	4	24
08	2	2	-	0	0	0	3	4	--
09	-	3	1	1	2	3	3	4	--
10	6	5	3	2	2	2	4	6	30
11	4	3	2	2	2	2	4	4	23
12	2	1	2	1	1	2	3	5	17
13	4	3	2	2	1	2	4	5	23
14	4	6	6	4	2	1	5	5	33
15	3	4	3	2	2	1	1	2	18
16	6	5	3	2	3	3	5	4	31
17	2	3	1	2	1	2	4	3	18
18	2	2	2	1	1	1	4	5	18
19	4	4	3	1	1	1	3	5	22
20	3	3	2	2	3	3	1	5	22
21	4	2	2	1	3	3	6	6	27
22	3	5	2	3	4	2	4	4	27
23	5	5	4	3	5	3	4	5	34
24	5	4	2	2	3	2	5	5	28
25	4	6	4	2	2	1	1	5	25
26	4	5	5	3	2	2	6	5	32
27	5	4	3	3	2	3	1	5	26
28	2	1	1	1	0	0	0	1	06
29	3	3	2	2	1	1	0	4	16
30	4	1	0	0	2	2	4	6	19
31	3	2	2	1	2	2	2	2	16

Mean of K-Sum is 22.0

Frequency of K-Indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	14	45	64	46	39	27	11	0	0	0	2

DECEMBER 1986

PRINCIPAL MAGNETIC STORMS

OBSERVATORY	Commencement				SSC-amplitude			Max. 3hr K-index			Ranges				UT End	
	day	hr	min	type	D(')	H(nT)	Z(nT)	day	(3hr-period)	K	D(')	H(nT)	Z(nT)	day	hr	
Port Moresby							NIL									
Charters Towers	13	12	..	...	..	..	..	14	(2,3)	5	8.2	65	20	14	10	
Gnangara							NIL									
Canberra	13	12	..	...	..	..	..	14	(2)	5	13.1	83	36	14	15	

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PRELIMINARY MONTHLY MEAN VALUES

OBSERVATORY	H	D		Z	F
	nT	deg	min	nT	nT
PORT MORESBY	35939	06°	35.1' E	-23717	43059
CHARTERS TOWERS	31781	07°	44.7' E	-38273	49748
GNANGARA	23241	03°	14.7' W	-53801	58606
CANBERRA	23699	12°	23.4' E	-53707	58703
MACQUARIE ISLAND	12619	29°	20' E	-63569	64809
MAWSON	18468	63°	52.4' W	-46246	49798
DAVIS	16636	76°	51' W	-52151	54740
CASEY	9618	91°	11' W	-64049	64767

The values are derived from magnetograms for selected quiet days except at Davis and Casey where they are derived from semi-weekly absolute measurements.

SUDDEN COMMENCEMENTS AND OTHER RAPID VARIATIONS

OBSERVATORY	DAY	TYPE AND QUALITY	TIME	SENSE AND AMPLITUDE OF CHIEF MOVEMENT		
				H(nT)	D(nT)	Z(nT)
PORT MORESBY			NIL			
CHARTERS TOWERS			NIL			
GNANGARA			NIL			
CANBERRA			NIL			

PRELIMINARY MONTHLY VALUES FOR 1986

PORT MORESBY	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	35939	06 34.2	-23714	43058	-33 25.1
February	35926	06 34.5	-23716	43048	-33 25.8
March	35928	06 34.8	-23715	43049	-33 25.7
April	35931	06 34.9	-23715	43052	-33 25.5
May	35931	06 35.0	-23715	43052	-33 25.5
June	35935	06 34.8	-23713	43054	-33 25.2
July	35941	06 34.9	-23712	43058	-33 24.9
August	35938	06 35.2	-23711	43055	-33 25.0
September	35934	06 35.0	-23710	43051	-33 25.1
October	35936	06 35.0	-23714	43055	-33 25.2
November	35930	06 35.0	-23714	43050	-33 25.5
December	35939	06 35.1	-23717	43059	-33 25.3
Mean	35934	06 34.9	-23714	43053	-33 25.3

CHARTERS TOWERS	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	31783	07 44.1	-38271	49748	-50 17.5
February	31774	07 44.3	-38273	49744	-50 18.0
March	31767	07 44.0	-38276	49741	-50 18.6
April	31776	07 44.3	-38273	49745	-50 17.9
May	31776	07 44.2	-38274	49746	-50 18.0
June	31779	07 44.2	-38273	49747	-50 17.8
July	31785	07 44.3	-38269	49748	-50 17.3
August	31780	07 44.5	-38269	49744	-50 17.6
September	31777	07 44.8	-38269	49742	-50 17.7
October	31779	07 44.5	-38272	49746	-50 17.8
November	31782	07 44.6	-38271	49747	-50 17.5
December	31781	07 44.7	-38273	49748	-50 17.7
Mean	31778	07 44.4	-38272	49745	-50 17.8

PRELIMINARY MONTHLY VALUES FOR 1986

GNANGARA	H	D	Z	F	I
	(nT)	deg min	(nT)	(nT)	deg min
January	23254	-03 17.2	-53784	58596	-66 37.1
February	23237	-03 16.7	-53791	58595	-66 38.2
March	23236	-03 15.9	-53789	58593	-66 38.2
April	23235	-03 15.7	-53788	58592	-66 38.2
May	23238	-03 15.6	-53791	58596	-66 38.1
June	23239	-03 15.4	-53792	58597	-66 38.1
July	23240	-03 15.2	-53789	58595	-66 38.0
August	23237	-03 15.3	-53792	58596	-66 38.2
September	23232	-03 14.7	-53797	58599	-66 38.6
October	23238	-03 14.6	-53796	58600	-66 38.2
November	23241	-03 15.0	-53799	58604	-66 38.1
December	23241	-03 14.7	-53801	58606	-66 38.2
Mean	23239	-03 15.5	-53792	58598	-66 38.1

CANBERRA	H	D	Z	F	I
	(nT)	deg min	(nT)	(nT)	deg min
January	23709	12 21.5	-53717	58717	-66 11.1
February	23698	12 21.6	-53719	58714	-66 11.7
March	23689	12 22.3	-53724	58715	-66 12.3
April	23696	12 22.6	-53717	58711	-66 11.8
May	23697	12 22.8	-53715	58710	-66 11.7
June	23699	12 22.8	-53712	58708	-66 11.5
July	23700	12 23.1	-53709	58706	-66 11.4
August	23694	12 23.1	-53710	58704	-66 11.7
September	23693	12 23.6	-53710	58704	-66 11.8
October	23696	12 23.6	-53709	58704	-66 11.6
November	23697	12 23.7	-53707	58703	-66 11.5
December	23699	12 23.4	-53707	58703	-66 11.4
Mean	23697	12 22.8	-53713	58708	-66 11.6

PRELIMINARY MONTHLY VALUES FOR 1986

MACQUARIE ISLAND	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	12604	29 18.0	-63615	64852	-78 47.6
February	12604	29 18.0	-63615	64852	-78 47.6
March	12586	29 18.0	-63600	64833	-78 48.4
April	12609	29 20.0	-63589	64827	-78 47.1
May	12586	29 18.0	-63596	64829	-78 48.3
June	12603	29 20.0	-63595	64832	-78 47.4
July	12608	29 15.0	-63584	64822	-78 47.1
August	12601	29 18.0	-63577	64814	-78 47.4
September	12596	29 20.0	-63584	64820	-78 47.7
October	12594	29 20.0	-63578	64813	-78 47.7
November	12593	29 23.0	-63575	64810	-78 47.7
December	12619	29 20.0	-63569	64809	-78 46.3
Mean	12600	29 19.0	-63590	64826	-78 47.5

MAWSON	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	18444	63 44.1	-46271	49812	-68 16.0
February	18456	63 47.3	-46322	49863	-68 16.6
March	18475	63 47.7	-46300	49850	-68 14.8
April	18448	63 46.8	-46297	49837	-68 16.4
May	18463	63 47.7	-46282	49829	-68 15.1
June	18464	63 48.2	-46269	49817	-68 14.7
July	18465	63 48.9	-46264	49813	-68 14.5
August	18456	63 48.3	-46263	49809	-68 15.0
September	18466	63 52.1	-46271	49819	-68 14.7
October	18468	63 51.2	-46260	49810	-68 14.2
November	18457	63 50.3	-46256	49802	-68 14.8
December	18457	63 52.1	-46251	49798	-68 14.7
Mean	18460	63 48.7	-46276	49822	-68 15.1

PRELIMINARY MONTHLY VALUES FOR 1986

DAVIS	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	16654	-76 49.0	-52270	54859	-72 19.6
February	16637	-76 44.0	-52228	54814	-72 19.9
March	16636	-76 45.0	-52217	54803	-72 19.7
April	16635	-76 52.0	-52235	54820	-72 20.1
May	16538	-76 52.0	-52230	54786	-72 25.8
June	(NOT AVAILABLE)				
July	16640	-76 51.0	-52216	54803	-72 19.4
August	16637	-76 49.0	-52222	54808	-72 19.7
September	16632	-76 52.0	-52204	54789	-72 19.7
October	16538	-76 58.0	-52224	54780	-72 25.7
November	16641	-76 54.0	-52165	54755	-72 18.4
December	16641	-76 51.0	-52151	54742	-72 18.1
Mean	16621	-76 50.6	-52215	54796	-72 20.6

CASEY	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	9656	-90 27.0	-64101	64824	-81 26.0
February	9653	-90 05.0	-64101	64824	-81 26.2
March	9660	-91 02.0	-64101	64825	-81 25.8
April	9602	-90 57.0	-64082	64797	-81 28.7
May	9620	-91 03.0	-64149	64866	-81 28.3
June	9620	-91 05.0	-64140	64857	-81 28.2
July	9624	-90 57.0	-64121	64839	-81 27.8
August	9640	-91 00.0	-64121	64842	-81 27.0
September	9634	-90 57.0	-64126	64846	-81 27.4
October	9621	-91 12.0	-64056	64774	-81 27.5
November	9660	-90 39.0	-64068	64792	-81 25.5
December	9618	-91 11.0	-64049	64767	-81 27.6
Mean	9634	-90 52.9	-64101	64821	-81 27.2

Preliminary Annual Mean Values of the Magnetic Elements 1986

OBSERVATORY	D deg min	I deg min	H nT	X nT	Y nT	Z nT	F nT
Port Moresby*	06 34.9E	-33 25.3	35934	35697	4118	-23714	43053
Charters Towers	07 44.4E	-50 17.8	31778	31489	4280	-38272	49745
Gnangara	03 15.5W	-66 38.1	23239	23201	- 1321	-53792	58598
Canberra	12 22.8E	-66 11.6	23697	23146	5081	-53713	58708
Macquarie Island**	29 19.0E	-78 47.5	12600	10986	6170	-63590	64826
Mawson	63 48.7W	-68 15.1	18460	8147	-16565	-46276	49822
Davis**	76 50.6W	-72 20.6	16621	3783	-16185	-52215	54796
Casey**	90 52.9W	-81 27.2	9634	- 148	- 9633	-64101	64821

* Port Moresby Results were provided by the PNG Geological Survey.

** The annual means for Casey ,Davis and Macquarie Island were obtained graphically from the periodic observations; they are better estimates than the arithmetic means.